

TABLE 1. ISOTOPIC RATIOS FOR U AND Th AND CALCULATED AGES OF SPELEOTHEMS FROM NARACOOORTE, SOUTH AUSTRALIA

Sample [*]	U (ppm)	(²³⁰ Th/ ²³⁸ U) _{set}	δ ²³⁴ U _‰	δ ²³⁴ U _(δ)	(²³⁰ Th/ ²³² Th) _{set}	Age (ka)
Thermal Ionization Mass Spectrometry Results						
SCC-4a ¹	0.07948 ± 0.00005	0.405 ± 0.002	202.1 ± 1.9	229 ± 2	333	44.2 ± 0.4
SCC-4c ¹	0.1022 ± 0.0001	1.091 ± 0.004	101.2 ± 3.2	270 ± 10	919	352 ± 12
SCC-4b ¹	0.16936 ± 0.00009	1.089 ± 0.003	90.3 ± 1.5	266 ± 9	990	381 ± 10
GHFS-13a ²	0.1713 ± 0.0005	0.748 ± 0.004	436.3 ± 4.0	542 ± 5	665	76.4 ± 0.7
GIHS-1(core-2)a ³	0.0688 ± 0.0003	0.593 ± 0.010	142.0 ± 7.0	177 ± 9	3919	78.1 ± 2.1
GIHS-1(core-2)d ³	0.05852 ± 0.00002	1.093 ± 0.005	100.5 ± 2.6	280 ± 10	97	358 ± 15
GIHS-1(core-1)c ³	0.1111 ± 0.0001	1.059 ± 0.005	49.6 ± 2.3	210 ± 30	5295	500 ± 50
SCC-6a ¹	0.03945 ± 0.00003	0.745 ± 0.003	265.6 ± 2.7	345 ± 4	1066	92.7 ± 0.8
SCFS-5b ¹	0.1732 ± 0.0001	0.728 ± 0.003	235.3 ± 2.1	307 ± 3	489	93.3 ± 0.8
SCFS-5a ¹	0.2577 ± 0.0006	0.745 ± 0.003	239.1 ± 2.8	314 ± 4	1490	96.2 ± 0.8
SCS-10X ¹	0.0244 ± 0.0002	0.809 ± 0.028	330.4 ± 9.8	430 ± 10	72	96.8 ± 5.3
SCS-10IX ¹	0.4951 ± 0.0002	0.825 ± 0.013	272.3 ± 3.8	370 ± 6	211	107.9 ± 2.9
SCC-7a ¹	0.03437 ± 0.00004	0.827 ± 0.005	248.0 ± 2.4	341 ± 4	618	112.3 ± 1.4
SCS10-IV ¹	0.1619 ± 0.0004	0.970 ± 0.011	207.2 ± 2.2	329 ± 5	7280	163.0 ± 2.2
SCS-10VII ¹	0.1088 ± 0.0003	1.018 ± 0.006	226.0 ± 3.3	371 ± 6	6709	174.4 ± 2.7
SCS-10II ¹	0.0507 ± 0.0002	1.033 ± 0.011	235.9 ± 4.1	389 ± 9	3863	176.5 ± 4.8 [†]
SCS-10VI ¹	0.5729 ± 0.0002	1.035 ± 0.005	235.8 ± 4.4	390 ± 8	1840	177.5 ± 2.7
SHC-7a ⁴	0.1054 ± 0.0001	0.716 ± 0.003	190.9 ± 2.9	251 ± 4	10514	96.7 ± 0.9
SHC-2a ⁴	0.1565 ± 0.0004	0.731 ± 0.003	228.8 ± 2.8	299 ± 4	29964	94.8 ± 0.8
SCS-11d ¹	0.06731 ± 0.00002	0.950 ± 0.002	203.4 ± 1.7	317 ± 3	3363	157.1 ± 1.3
SCS-11c ¹	0.04147 ± 0.00003	1.003 ± 0.010	188.2 ± 2.5	317 ± 6	18409	183.6 ± 4.6
CCFS-2a ⁵	0.0949 ± 0.0002	1.008 ± 0.005	259.6 ± 3.6	408 ± 6	2797	159.2 ± 2.2
SCFS-2c ¹	0.14028 ± 0.00007	1.034 ± 0.003	244.8 ± 1.4	400 ± 3	577	173.6 ± 1.3
SCC-10b ¹	0.09127 ± 0.00004	1.102 ± 0.008	308.3 ± 2.4	508 ± 6	1145	176.2 ± 3.0
SCC-10a ¹	0.21678 ± 0.00007	1.089 ± 0.002	234.1 ± 1.3	415 ± 3	24365	202.2 ± 1.6
SCFS-3a ¹	0.02289 ± 0.00005	1.059 ± 0.014	232.1 ± 5.3	400 ± 10	25	189.0 ± 6.7
GHS-1a ²	0.1003 ± 0.0001	1.072 ± 0.004	216.5 ± 1.6	385 ± 4	3946	203.0 ± 2.5
GHS-1b ²	0.3672 ± 0.0005	1.070 ± 0.002	200.6 ± 2.0	365 ± 4	21749	210.8 ± 2.0
SCS-1a ¹	0.0371 ± 0.0003	1.094 ± 0.027	200.6 ± 2.0	400 ± 30	2057	211 ± 16
FCFS-1a ⁵	0.1544 ± 0.0001	1.029 ± 0.011	159.1 ± 2.5	291 ± 7	32	212.6 ± 6.7
SCC-2b ¹	0.1815 ± 0.0002	1.115 ± 0.005	163.5 ± 2.4	356 ± 8	18449	274.3 ± 6.2
SCC-2b B ¹	0.1661 ± 0.0005	1.107 ± 0.007	150.7 ± 3.7	340 ± 10	137	282.5 ± 9.1 [†]
CCFS-3a ⁵	0.0576 ± 0.0001	1.095 ± 0.005	142.9 ± 3.7	320 ± 10	71	279.2 ± 7.2
SCFS-4b ¹	0.613 ± 0.002	1.106 ± 0.009	150.4 ± 3.2	330 ± 10	19839	282 ± 11
SCC-1b ¹	0.1837 ± 0.0002	1.121 ± 0.004	154.1 ± 2.9	355 ± 9	10318	294.0 ± 6.9
SCC-1a ¹	0.2330 ± 0.0004	1.109 ± 0.006	142.4 ± 3.4	330 ± 10	18005	295.7 ± 8.8 [†]
CC St-1a ⁶	0.1105 ± 0.0002	1.081 ± 0.004	80.1 ± 2.6	250 ± 20	146	399 ± 19
SASM-1a ¹	0.3416 ± 0.0003	1.076 ± 0.004	73.8 ± 2.8	240 ± 20	2989	411 ± 21
GH-CORE A a ²	0.1911 ± 0.0004	1.098 ± 0.004	79.2 ± 3.1	310 ± 40	2746	480 ± 40
Alpha-counting Results [§]						
Fox St-1 ⁷	0.198 ± 0.008	0.270 ± 0.017	350 ± 60	380 ± 60	45	24.0 ± 2.1
GH St-1 ²	0.19 ± 0.01	0.330 ± 0.027	270 ± 80	300 ± 90	>1000	32.4 ± 3.9
GH F-1/1 ²	0.219 ± 0.008	0.483 ± 0.022	380 ± 40	430 ± 50	38	45.9 ± 3.0
Fox St-2 ⁷	0.211 ± 0.002	0.446 ± 0.037	240 ± 80	280 ± 90	31	47.8 ± 6.3
WC St1/1 ⁸	0.13 ± 0.01	0.508 ± 0.048	210 ± 90	250 ± 100	39	58.2 ± 9.4
WC St1/2a ⁸	0.187 ± 0.006	0.787 ± 0.049	230 ± 20	310 ± 30	118	106.3 ± 10
WC St1/2b ⁸	0.17 ± 0.01	0.677 ± 0.061	230 ± 40	290 ± 50	212	84.1 ± 12
NFC St1/2 ⁴	0.19 ± 0.01	0.608 ± 0.048	300 ± 90	290 ± 100	73	71.3 ± 10
NFC St1/1 ⁴	0.082 ± 0.006	0.689 ± 0.065	300 ± 90	380 ± 110	>1000	79.2 ± 15
SC FS1/2 ¹	0.26 ± 0.01	0.732 ± 0.043	220 ± 50	290 ± 70	107	96.1 ± 11

Notes: 2σ errors are calculated by error propagation. Decay constants: $\lambda^{230}\text{Th} = 9.1954 \times 10^{-4} \pm 7.19 \times 10^{-6}$; $\lambda^{234}\text{U} = 2.8349 \times 10^{-4} \pm 5.7 \times 10^{-9}$; $\lambda^{238}\text{U} = 1.55125 \times 10^{-10} \pm 1.66 \times 10^{-13}$.

^{*}Sample sites: 1. Spring/Starburst Chamber, Victoria Fossil Cave (VFC); 2. Grant Hall, VFC; 3. Great Hall, VFC; 4. New Formation Chamber/Straw Haven, VFC; 5. Fossil Chamber, VFC; 6. Main Chamber, Cathedral Cave; 7. Fox Cave; 8. Wombat Cave.

[†] Sample not included in Figure 2 because of overlapping 2σ age errors with neighboring subsample.

[§] Alpha-counting data from Ayliffe and Veeh (1988); only those sample with 2σ errors < ±20 k.y. are shown here.